Rural Lines

FEBRUARY 1956

Electrification Section

See page 12.

RURAL ELECTRIFICATION ADMINISTRATION • U. S. DEPARTMENT OF AGRICULTURE

A Message from the ADMINISTRATOR

One of the accomplishments of the REA program that has deeply impressed me has been the increasingly sound financial position of the electric borrowers, most of which started from "scratch."

As new figures just available show us, a number of the REA electric borrowers have made a real financial improvement in the past year. The number of borrowers whose current revenues were not sufficient to meet estimated maximum debt service has dropped 25 percent in a year's time.

This improvement, I believe, reflects a growing interest by directors and managers in management improvement. More are participating in discussions on how to solve business problems. You are trying to benefit by the experiences of others and to develop new ideas.

Even if we use yesterday's solution as the answer to today's problem, this is not enough. Management's never-ending job is to anticipate needs before they become actualities. Management must constantly find better methods to accomplish the objectives of the business. This calls for developing the people who will play a large part in the eventual success or failure of our businesses, and who will improve the quality of co-op management. Directors, for example, can make it possible for their staffs to meet with other management people and in every way keep up with the latest techniques.

In any case, we must not let our good record today make us lax in the future. Despite the over-all good record we still have some situations that are not showing improvement when they should be doing so. In other words, there is plenty to challenge us. If we are conscientiously concerned about the future of the REA program, what it can accomplish for our farmers, we will help each other in the job of making tomorrow's record even better.

Aueker Nelsen

Administrator.

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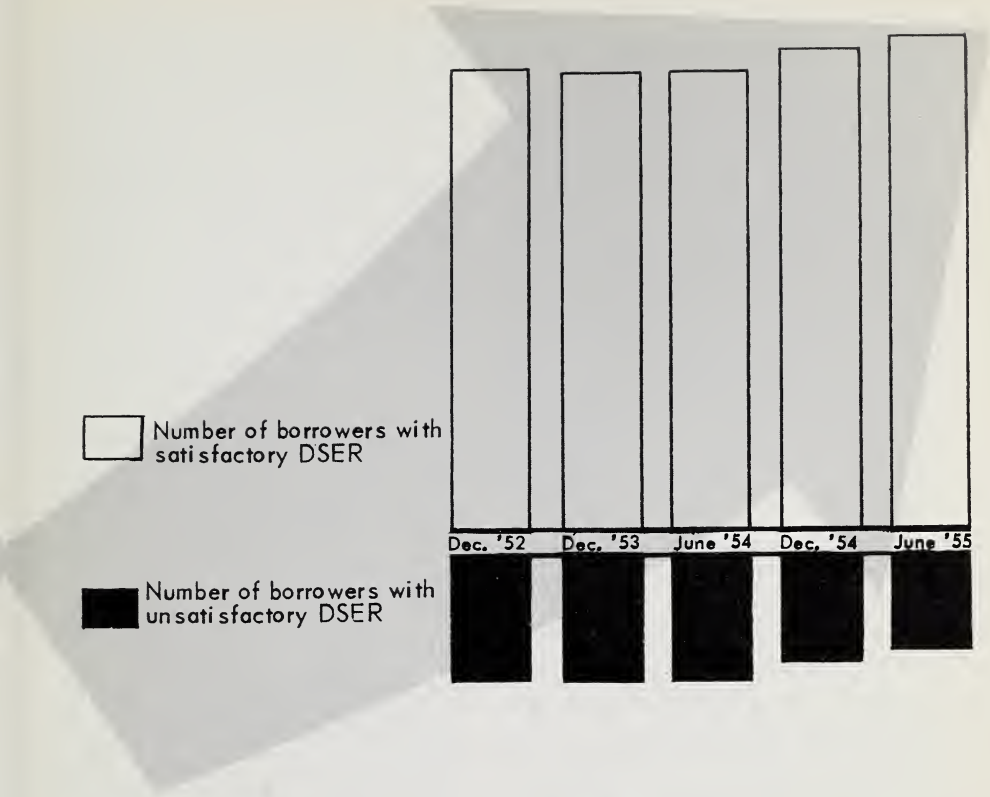

The Trend Is Upward

New DSER Report Reveals 25% Improvement For REA Borrowers

Figures just made available show that a number of REA electric borrowers have made a real improvement in their financial operations.

Here is the record of electric distribution borrowers whose current revenues were found insufficient to meet debt service considering the age of the system:

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To find out what was back of the last year's improvement, the editors of RURAL LINES interviewed REA's management specialists. Here is a boil down of the discussion.

Q. How do you take the temperature-reading that gives a picture of the program's financial health?

A. We measure the borrower's ability to meet the estimated maximum debt service on the loans currently advanced. The figure we

get is called Debt Service Earned Ratio, or DSER, for short.

Q. Would you explain how Debt Service Earned Ratio is figured?

A. First, a borrower should be able to meet its cash operating expenses, including taxes. This done, it should be able also to set aside an amount equal to at least 1 percent per year of its plant in a renewal and replacement fund. Then, if the remaining revenues are exactly equal to the estimated maximum debt service on the money borrowed from REA, the borrower would have a DSER of 100.

Q. What would the borrower's DSER be if its revenues were adequate to meet, say, only half of that estimated debt service?

A. If the borrower's revenues —above the operating needs and the reserve mentioned — would pay only half of the estimated maximum debt service, then the borrower would have a DSER of 50.

Q. Do you make any allowance for age — certainly a borrower can't be expected to have full earnings at the start?

A. Yes. We expect borrowers whose lines have an average age of 6 years or over to be able to maintain a DSER of at least 100. Younger borrowers should be somewhere between 0 and 100, the minimum depending of course on the age of the system.

Q. The figures we have here (see chart on page 3)—what do they show?

A. The figures show a remarkable improvement. Specifically, the number of borrowers whose DSER was inadequate for their age group, when calculated for the 12-month periods ending in June and December as shown, dropped by over 25 percent.

Q. Is this much of a change?

A. Yes. We have been calculating DSER for distribution borrowers since 1952. Before December 1954, the number of borrowers with unsatisfactory DSER had remained unusually constant —at just under 200. The drop from June 1954 to December of 1954 was the first major change and the further drop as of June 1955 seems to us to be significant. Of course, we still have some borrowers that are not improving as rapidly as they should.

Q. What has caused the 25 percent drop?

A. There are many reasons, but taken as a whole, you'd have to say better management. For example, we know that a number of the borrowers making the improvement gave increased attention to helping their members use electricity profitably. In some instances, borrowers were able to install more efficient operating practices. Others found at least part of the answer in making added capacity available at a lower unit cost. These things add up to better management.

Q. What advice would you give a borrower with an unsatisfactory DSER?

A. First step is to make a statistical analysis of sufficient detail to show why the revenues and the DSER are not adequate. Sometimes the answer is obvious, as when you have unusual storm damage. More often a thorough analysis is needed to bring out the real facts.

Second step is to make a study of the future. The object is to forecast what will happen if pres-

ent operating practices and procedures are continued. If this forecast shows a satisfactory future, fine. If not, then you've got a job to do.

In that case, the next step is to develop a management program —and it's best to do it in writing so that you'll know what you have. This program would set forth in detail what should be done with respect to both construction and operation.

To make sure you are on the right track, you would make a forecast based on the operating practices and procedures as set up in this new program.

Q. Can a borrower with an unsatisfactory DSER get an additional loan?

A. It probably can if there is definite evidence of a program to correct the unsatisfactory situation. The DSER is essentially a measure of past performance. The feasibility of loans is based on a determination that future revenues will exceed future expenses including debt service. A borrower's DSER does not necessarily indicate what its future earning capacity will be, although of course it is one of the things that is considered in determining the feasibility of additional loans.

Q. Is "unsatisfactory DSER" the same as being delinquent?

A. No. Only about a dozen borrowers are actually delinquent in the repayment of their loans to REA. Some borrowers are making interest and principal payments by using money that ought to go into a renewal and replacement fund. The initial deferment period on cash payments of interest and principal also helps borrowers with an unsatisfactory DSER to avoid actual delinquency. However, when the DSER is inadequate, both REA and the borrower need to "take another look."

Q. Is the DSER a measure of efficiency? In other words, does a high DSER mean a borrower is being well operated?

A. To the extent that "efficient operation" includes earning 100 percent debt service, the DSER can, of course, be called a measure of efficiency. However, we do not ordinarily think of it as being a measure of efficient operation; it is simply a measure of the adequacy of revenues available to meet estimated maximum debt service.

Q. Does this mean a well operated borrower might have a low DSER on occasion?

A. This could happen and has. A board and manager may be doing as well as can be expected, for example, when a storm causes a loss sufficient to produce an unsatisfactory DSER. On the other hand, sometimes through fortuitous circumstances a borrower can have a high DSER when maybe its operating expenses are 10 or 20 percent higher than they ought to be.

Q. How can a director find out the DSER of his cooperative?

A. No doubt the manager already has the information, or can calculate it. REA Bulletin 100-4, "Security of REA Loans to Electric Distribution Borrowers," tells how to compute DSER. Any REA operations field representative would be glad to discuss the formula with the board. Inquiries can also be made directly to the Area Offices, which maintain individual borrower data.

Keeping Pace With Demand

Plan for Pinpointing Load Growth Helping Kentucky Borrowers

A plan for pinpointing load growth is helping 6 Kentucky rural electric cooperatives pick the time and place for needed new construction and system improvements.

The plan, as prepared by a Kentucky consulting engineering firm in cooperation with the borrowers, was developed after studying the load growth trends of the 6 co-op systems for 8 years. Record keeping, worked up from information processed in the co-ops' offices, is the key to the plan. All told, the fact-finding operation requires about 2 weeks of record keeping a year.

At best, the job of keeping up with the changing power requirements of rural consumers poses a tough hurdle for co-ops. They look to their growth forecasts for guidance in planning ahead. But system growth may not develop according to expected patterns, and half-way through the forecast period, consumers in some areas may not have adequate service. Co-ops want to know when to "heavy up" to keep ahead of service complaints.

The load analysis plan being carried out in Kentucky offers one solution to the question. Other borrowers have adopted other satisfactory methods. This is an account of the plan carried out by one borrower, Harrison Rural Electric Cooperative, Cynthiana.

The procedure used by these Kentucky systems was developed by L. M. Holdaway and Associates of Lexington. Combined with measurements of system voltages and currents, it provides valuable data for operation, improvement and construction of an electric system.

REA likes the idea of tailoring capacity to fit consumer needs. But to do this the borrower needs to know the loads and be able to predict the loads on the various parts of its system in addition to having this information for the system as a whole.

William O. Penn, manager of Harrison Rural Electric Cooperative, says that he has been following the modified load evaluation method for 3 years and is making good use of the load growth data. Harrison REC has some 5,100 members, 1,500 miles of line, and a monthly average use of 211 kwh per member.

The plan provides for a perpetual system of load checking which permits actual load levels to be weighed in any or all parts of the co-op system.

In actual operation, it depends entirely upon good maps kept up-to-date, plus a system of member account numbers correctly tied in with map location.

The method accounts for all existing services, idle services, all

potential unserved consumers, and a reasonable allowance for new buildings to be constructed during the predicted growth period. Resulting design loads are based upon the monthly usage which caused maximum voltage drop.

According to Mr. Penn, here are the steps his system takes in getting its load growth information:

1. Good maps. These are a "must" and should be directly keyed to consumer account numbers.
2. Breakdown of system into small areas which can be controlled on card index. Sections of lines feed from 5 to 50 consumers and cover about 3 miles of line. The smaller the section, the more flexible the system is for future changes.
3. A plan for grouping cards according to substations and feeders in the design plan.
4. Figure the average peak load for each of the design feeders and substations.

This information is used as the basis for design of individual feeders and substations and provides a realistic picture of the load level at the time of design in each component of the system. Mr. Penn tells you, "We are well satisfied with this method of keeping tab of the rapidly growing load on our system. With this method we can periodically, or whenever we choose, figure the load on any phase in a short time. And if the capacity is inadequate, we can take steps to heavy up the lines in that particular section."

Manager Penn (left) and L. M. Holdaway, Consulting Engineer, discuss records of Harrison Rural Electric Co-op.

Manager Penn takes a map and points out the areas when he says, "Our average consumption varies from 100 kwh a month in some sections to 400 in others. In applying this method, we can provide adequate capacity exactly where needed."

Mr. Penn predicts that over the years, the co-op will realize a considerable saving in construction costs.

On previous studies, Harrison Rural Electric used the same kwh consumption for the entire system. This resulted in having excess capacity in some places and not enough in others.

Harrison Electric discovered its need for an accurate method of plotting load growth after World War II. Basic information needed for forecasting future power use requirements was worked out jointly by the co-op and REA personnel in 1949.

However, as new and wider uses of electricity developed in the post-war years, it became more and more apparent that planned facilities would be inadequate.

That was when the management decided that the load forecasts for the overall system should be re-examined and broken down into forecasts for individual circuit components of the system and adopted Holdaway's plan.

Atom Waste Disposal

Radioactive Ash Creates Safety Problem in Nuclear Power Plants

Borrowers considering nuclear power plants are faced with many problems essentially different and more complex than those associated with conventional power plants.

One of these problems, which directly relates to human safety, is that of atomic waste disposal. Nuclear power plants like conventional ones have an "ash" disposal problem. In conventional generating plants ash disposal is a nuisance and sometimes a bulky problem. Nuclear waste or ash is small in weight or volume, but it has dangerous radioactivity, which makes disposal the complex problem it is.

What is this dangerous nuclear ash?

In the nuclear fission process atoms of uranium are split into two atoms, each of which are similar but not quite the same as atoms of the natural elements. These similar but not-quite-the-same atoms are not stable. Radioactive elements achieve stability by emitting various particles and rays. This is called radioactivity. The type and intensity of the radioactivity depends on the particular element. Some of these elements become stable or cease to be radioactive in a matter of seconds after intense radiation; others continue with dangerous radioactivity up to hundreds of years.

These radioactive ashes are completely and intimately mixed with the uranium fuel in the nuclear furnace fuel elements. Some of the fission products or ashes have the effect of slowing down or stopping the nuclear fire. The fuel must, therefore, be removed from time to time and replaced with a new supply. The fuel removed, while no longer satisfactory in the reactor, is extremely valuable since only a part of it has been "burned." The ash may be removed from the remaining fuel by various chemical processes which unfortunately add bulk to the ashes complicating the disposal problem. As a result of this processing our ashes appear in the form of gases, liquids and solids—usually all three mixed.

When we have the ash separate from the fuel the problem of final disposal must then be solved.

Nuclear industry has, of course, already produced nuclear "ash." But the quantities involved to date have been small compared with those that will be produced when nuclear power comes into widespread use.

This is one of a series of basic articles prepared by REA personnel who are cleared for atomic energy work and are engaged in REA's liaison work with the Atomic Energy Commission. The series will deal with the nature of atomic energy and its use in producing electric power.

Because of this difference in quantities the disposal methods used now may not be satisfactory later. Here are some of the methods now used, and proposed for disposing of the various forms of this nuclear ash.

Gases, at least for the present, can be released to the atmosphere in controlled amounts when weather and wind conditions are such that no dangerous concentrations develop. In the future, when the quantities become large, it may be necessary to chemically process them to solids or liquids for disposal.

Liquid and solid "ashes" at present are being disposed of by storing them in underground tanks or containers. Here again quantities of the material involved are an important factor. As long as the quantities are small it is easy to keep a close watch and control. Care must be exercised to see that the containers do not develop leaks and allow the liquids to become mixed with ground water which eventually may be used for drinking. This also applies to solids which might be dissolved by the ground water.

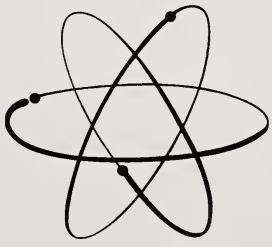
Since some of the elements involved continue radioactive for perhaps hundreds of years, the tanks or containers must be examined periodically so that they may be replaced when they appear to be corroding away before the danger of radioactivity has disappeared.

Disposal of ash in containers dropped to the bottom of the ocean has been suggested, but the problems of leaks, corrosion and ultimate contamination of ocean water would be present with this method.

Scientists are proposing to overcome these problems when large quantities of nuclear ash are involved through a combination of several methods already discussed for those elements which have relatively short lives. For those with long lives, it has been proposed that they be mixed with clays and baked into special bricks which would be completely insoluble in water. Such bricks would then be buried in dry places as far away from civilization as possible or in deserts and other remote places.

It has also been suggested that the most dangerous radioactive elements be put into the core of special reactors where the neutron bombardment would change them into other elements or less dangerous varieties of the same element.

Some experts believe that the radioactive elements will become so important in industry and research that the demand will exceed the supply. If this situation develops an otherwise expensive and dangerous nuisance will become a valuable by-product of the nuclear power industry. But until it does, any organization entering the nuclear power field will have to consider the dangers of the disposal problem, the complexity, and the costs.



Atomic Energy Terms

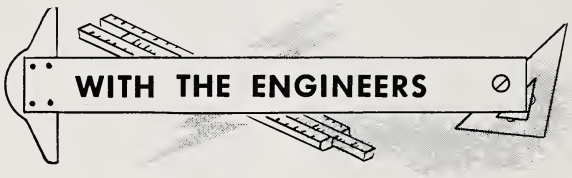
Atom—An atom is the smallest part of an element which retains all the characteristics of the element. Some common elements are hydrogen, oxygen, carbon, iron, sodium, uranium.

Chain Reaction—A chain reaction is a process which sustains or increases itself without the application of outside forces. Fire is a chain reaction.

Core—The core of a nuclear reactor is the active part where the chain reaction takes place and the heat of the process is developed. The core consists of an assembly of fuel elements.

Radiation—Certain materials and most elements which have been exposed in a reactor are unstable in the nuclear sense. To become stable they emit various particles and rays which collectively is called radiation. The most common forms of radiation are beta particles (electrons) and alpha particles (Helium Atom Nucleus) and gamma rays (similar to but more penetrating than X-rays).

(Note: From time to time, additional terms used in atomic energy discussions will be defined for your information.)



Substation transformers and regulators have burned out because the regular tanks were not grounded or were grounded improperly.

. . . . .

Insurance costs on building can, quite often, be reduced by simple, inexpensive corrective measures.

. . . . .

The American Institute of Electrical Engineers reports an increasing awareness on the part of management of the need for system planning.

. . . . .

If low temperatures congeal oil, operation of mechanism within the oil will be slow.

. . . . .

Chemical brush control should not be considered a one-shot proposition. Two or more applications over 2 or 3 year intervals usually accomplish a high degree of control.

. . . . .

If the aluminum strands on ACSR break, the steel wire may be weakened through heating developed by the current flow.

PIONEER

Rufus Himes

Rufus Himes, president of the Jefferson Electric Cooperative, Brookville, Pa., has been active in helping farmers get electric service ever since he was appointed by the Grange to serve on its first rural electrification committee.

The result of the committee's work was a demand by farm people for electric power that lead to the formation of the Jefferson Electric Cooperative. Rufus Himes actively assisted in the organization, was a charter member, has been a member of the board from the beginning, and has served several terms as president.

Mr. Himes was selected to represent the membership of the Jefferson Electric Cooperative when the question of generation and transmission of cooperative power became important. He helped activate a statewide program of providing power at wholesale rates for the cooperatives, and was elected to serve as a director of this statewide organization.

Mr. Himes was born on a farm in Knox township shortly before the turn of the century, and, except for a 1-year enlistment in the U. S. Marine Corps, he has resided on and farmed the same farm on which he was born.

As well as being active in the Grange, Mr. Himes is a member of the board of directors of the Pennsylvania Farm Bureau.

His interests have also included schools. For 28 years he was a member of the Knox township school board, and for several years was a member of the county school board, of which he was president for a time.

Mr. Himes is of the opinion that rural electrification is just beginning to show real results on the farm. He feels that electric farming is the only answer to the labor loss suffered by farmers and that the use of electicity on the farm will continue to increase as the standard of living of farm people becomes equal with that of city folks. He also believes that developments in the field of atomic energy will lower the cost of power so that farmers can really begin to reap the benefits.

The persons featured on this page have played key roles in bringing rural electric service to their own communities, thus helping their neighbors receive the benefits of electric power. This page also acknowledges the contributions of those many others who are nameless to us, but known to many of our readers. We salute all of our pioneers.

Workshop Presents

Power Use Panorama

The St. Louis National Power Use Workshop presented a panorama of power use activities throughout the United States. Out of the reports, exhibits, discussions, and informal exchanges among the delegates came many views of what constitutes power use activities.

Following are some highlights of this assembly and the power use activities which have been stimulated by inter-industry cooperation.

The Pennsylvania Farm Electrification Council is one of several which has introduced a strong youth emphasis into its program. The Pennsylvania council has stimulated youth participation in the 4-H electric projects and has provided vocational agricultural teachers with a comprehensive manual on farm electrification. The council is also working with the State University to provide additional instruction in electricity for farm youth leaders.

In Ohio, New York, New Mexico, Illinois, the New England states, Virginia and New Jersey, the State councils support one or more farm youth activities. Oklahoma plans to make the 4-H club leader-training program an important part of its 1956 plans.

Among all of the activities, farm water systems and adequate wiring programs have the highest preferences. Several states have found new approaches for what might seem an old, old story.

North Carolina rural electric leaders encourage farm "do-it-yourself" addicts. Local plumbers were persuaded to create displays of various installations, as they would be set up on the users' farms. Displays had open backs so farmers could see how the pipes and various parts of the water and plumbing installations would be put together.

In Georgia, water systems promoters had the happy thought to prepare basic packages of materials (pump, pipe, valves, etc.) so that the farmer could buy on the spot following the local demonstration. Special financing plans were available.

Tennessee power suppliers joined with county health authorities to carry out an intensive educational program based on health and sanitation. As their part, local dealers were asked to provide a complete bathroom outfit to be awarded at a public drawing. This created tremendous interest and brought out crowds of 5,000 and more.

When a Tennessee widow, nearly blind and dependent on a $35 monthly pension, won a complete bathroom outfit, her home was found to be a windowless shack in which she lived rent-free. The generous landlord built a new house for her to provide a proper setting for the modern equipment.

A Virginia widow was the top winner in the Virginia Farm Electrification Council's water systems essay contest. With her 12 children, she operates a small farm in southwest Virginia. The $250 U. S. Savings Bond she won was quite a windfall for her.

The Kansas IIFEUC presented its "Survey of Farm and Home Equipment," based on a 10 percent sample of all rural residences and farm consumers served by Kansas power suppliers. The survey shows the numbers used by rural consumers and saturation rate of 19 electric home appliances and 21 items of farm electric equipment, and the immediate potential demand for each. The Kansas survey also covers buying intentions, revealing an immediate potential demand for $20,000,000 of new equipment. Electric welders, milking machines, and grain elevators top the list for farm production aids while home freezers, TV sets, water systems and air conditioners top the list of household appliances.

The wide open spaces of the West may be attractive to tourists and cow pokes, but they make it difficult to carry on a coordinated statewide power use program, according to Arizona's chairman, Fred McQueary. G. H. Sullivan, California chairman, showed a color film of a king-size sprinkler irrigation installation

which will water 680 acres at one time.

As the latest states to join the industry program, Arkansas, California and Texas could not report definite achievements, but came to the Workshop to learn all they could to get their own state programs moving at top speed. Manager Robert Jefferson and Kenneth T. Meredith of Delaware Electric Cooperative, Greenwood, came to seek ideas and projects for consideration by a proposed Delaware inter-industry council.

C. H. McCabe, **Kentucky Inter-Industry Farm Electric Council** member, probably expressed the feeling of many attending the Workshop, when he said, "We have done a good job in 1955 and hope to do a better one in 1956."

Kentucky Chairman Harry Carloss reported that the Kentucky Council held 8 area meetings with appliance and equipment dealers, conducted a training school for sellers and installers of farm water systems, published a directory of manufacturers, distributors and dealers of electrical farm equipment to help farmers locate the nearest source of supply, and surveyed schools teaching home economics to determine present equipment and future needs.

The Illinois Farm Electrification Council presented its new "Report of Survey of Electrical Equipment on Illinois Farms," which was prepared in cooperation with the Department of Agricultural Engineering at the University of Illinois. In addition to saturation data for the state as a whole, the Illinois report contains detailed information for each county, including basic farm information. The basic survey form carried 13 farm home electric items, 5 gas appliances and 19 farm chore items. Returns were received from 136,807 of the State's 195,268 farms.

Several states placed stress on adequate wiring as an important first step toward load building. These include New Mexico, South Dakota, Oklahoma and New York. A. H. Kessler of the North Central Electrical League displayed a copy of the new manual prepared as a guide to adequate wiring activities in Minnesota.

Many states are too big or diverse for one state-wide program. Recognizing this, several councils have taken steps to take the power use program down to the grass roots.

The South Carolina Farm Electrification Council is now organizing county committees to undertake local programs in line with the State group's special projects.

West Virginia is creating a special local committee for each state project, with the county agent acting as temporary chairman.

Illinois has succeeded in introducing power use into Extension Service district programs. Five have inter-industry committees.

Women have the last word. "Tell-a-woman" is the best means of promoting water systems in rural areas vows George Doak, Atlanta representative of Fairbanks, Morse & Co. Like-minded M. L. Mumgaard of the University of Nebraska and the Nebraska Inter-Industry Electric Council urges that women be given an active part in power use programs.

Lineman, Burned, Escapes Serious Injury in Freak Accident

Borrower Report Warns Others

Here is the description of an accident which could have proved fatal but for Lady Luck. It was submitted to REA by the system manager, with the expectation that others could benefit from knowing what happened. The manager writes:

"We were advised that service was off at this house. Two men were dispatched to remedy the trouble. When they arrived they found the fuse on the transformer blown. The transformer was on a tap about 4 miles ahead of a 10-amp breaker which did not open. It was protected with a ⅓ amp fuse. It served one span of 2 wire No. 6 copper underbuild and a service about 100 feet long.

"The men re-fused the transformer and the lineman came down the pole thinking that the job was completed. About the time he reached the ground, the fuse blew again with considerable force indicating a heavy fault.

"One of the men then went to the house and removed all fuses in the house. The transformer was re-fused and it held for several minutes while both men experimented at the house with replacing fuses. When the transformer fuse blew again, it made a very loud noise.

"The lineman went back to the pole, disconnected the secondary leads and re-fused the transformer. He hung the hot stick on the neutral wire and while readjusting his position preparatory to testing the secondary with a test light, something happened which left him unconscious, hanging back in his belt with contact burns on both hands and flash burns on both arms. (The man recovered and is back at work.)

"The transformer was re-fused again and it blew in about 30 seconds with enough energy expended to shake the pole. The transformer was replaced with a new one.

"What the lineman contacted we do not know. It would have been impossible for him to have reached the bushing without belting off above the lowest underbuild wire which would have prevented him from coming to the

ground after the contact. Since he did slide down the pole, we know that he got his burns either from the ground connections which were solid and in good shape, the secondary bushings which were not connected to the secondary wires or the case itself."

The transformer was submitted to the manufacturer for test.

Following are excerpts from the manufacturer's report:

"External examination of the tank, bushings, etc., showed nothing out of the ordinary, and the unit was then put through the test procedure, where it was found that both the high-voltage and low-voltage windings were entirely clear of grounds. The secondary winding tested good, but there was an open circuit in the primary winding . . .

"The transformer was then torn down—and examination of the iron core showed no burned spots . . . The outer and inner coils of the secondary winding were . . . found to be in perfect condition. Barriers between the secondary and the high voltage winding were in good condition, indicating that there was no flashover between the two windings . . .

"As the preliminary test indicated, the trouble occurred in the high voltage winding . . . In the center of it, were found 2 or 3 distinct places where arcing had occurred. At each of the burned places, there were about 10 or 12 turns either burned open or burned together, which is a typical thing found in transformers that fail from turn to turn . . . It was impossible to determine just what caused the fault . . .

"It is hard to estimate or calculate the amount of voltage present under such a condition, since the ground impedance, the amount of current in the surge, and the frequency of the surge all contribute to the build up of voltage in the ground lead. We estimate it was in the order of 1000 volts which is sufficient to render a man unconscious but not enough to severely burn him . . . "

What could have been done to prevent this accident, or what should be done in the future?

Safety engineers say that the lineman could have avoided being burned had he worn safety gloves from the time he left the ground until he returned to the ground.

The manager writes that this lineman wore rubber gloves until he started to work checking the secondary voltage on the transformer. Then he took them off.

The manufacturer advises:

"The lineman should be especially warned to be on guard, as many freak things can happen, and, as has been shown here, even the ground lead can be 'hot.' It is not good practice to re-fuse a transformer more than once or twice, for if fuses continue to blow there is something wrong in the transformer . . . I surely cannot criticize the lineman for disconnecting the secondary terminals from the transformer, the check for voltage on them, but I feel that if this had not been done, the secondary terminals would have been solidly tied into the pole neutral and there would have been no difference of potential between them . . . One has to be very, very careful when working on a pole when there is a suspicion of damaged equipment."

Rural Lines

Telephone Section

Maurice Jones (left), office manager and accountant, points out steps in co-op procedure to Miss Frances Spillman, clerk, South Central Rural Telephone Co-op., Glasgow, Ky. (See page 19.)

Change In Engineering

New Pre-Loan Procedure Gives Applicants More Responsibility . . .

At its telephone staff conference in Memphis, Tennessee, on January 16, REA announced that it will no longer require approval of the applicant's selection of an engineer to perform pre-loan services. It also announced that REA approval of agreements for pre-loan engineering services is no longer required.

This change in procedure will permit applicants full latitude in making arrangements with engineers to perform the necessary detailed engineering design and survey which REA requires as a basis for considering a loan application. It will, at the same time, place greater responsibility on applicants to assure that the work is performed economically in a manner acceptable to REA.

REA strongly recommends that borrowers continue to give the same careful consideration as in the past to the selection of fully qualified personnel to perform the necessary pre-loan engineering work. Applicants will be urged to discuss with REA field representatives proposed methods for having pre-loan engineering services performed.

As in the past, REA will continue to make available to borrowers who desire to use it a standard contract form for pre-loan engineering, but REA will no longer insist on the use of this form of contract. Copies of this REA Form 835, which no longer requires approval of the Administrator, will be forwarded to applicants on request in order that they may formalize their arrangements with engineers for their pre-loan engineering. This revised contract specifies in section 1 of articles III and V, that the area coverage survey and area coverage design shall be made in a form acceptable to REA.

Applicants and their engineers are urged to follow the procedures recommended by REA in order to assure proper scheduling and to produce fully adequate studies at the lowest practical cost.

Throughout the preparation of pre-loan studies, it must be borne in mind that these studies not only constitute the basis for a loan, but will serve as the basic plan for construction in the event a loan is made.

REA's action should not be construed as lessening its requirements for the preparation of studies acceptable for the processing of loans. The change places greater responsibility on the applicant and at the same time gives greater latitude to the borrower in determining the most acceptable methods of carrying out pre-loan engineering studies.

As in the past, reasonable costs for the preparation of acceptable reports may be reimbursed out of loan funds, if a loan is subsequently approved.

Post-loan engineering services will remain subject to REA approval as in the past.

Kentucky Borrower Develops Forms For Collecting Data on Recurring Operations Items

It's All in the Record

In Glasgow, Ky., a rural telephone borrower is building up striking evidence of the importance of adequate records in an expanding business.

South Central Rural Telephone Cooperative Corporation serves some 3,200 stations in 6 counties —Green, Hart, Monroe, Metcalfe, Barren and Allen. With a widespread clientele like that, records are not only essential, but must be up-to-the-minute in accuracy.

To keep close tab on this broad service area, the system's management has adapted REA-suggested forms to meet local needs and worked out new ones to provide fingertip control over its operations. The result is that routine record keeping has been simplified and made easier for employees, and more effective for management.

William R. Bacon, South Central's manager, explains it to you this way.

"We try to keep our fact-finding steps as simple and easy as possible. Complex business forms make control and clerical jobs tougher all around. We are constantly seeking ways to shorten and simplify our forms consistent with good fact-finding practices."

The first form Mr. Bacon shows you when you ask about his "trade secrets," is the "Report of Unpaid Accounts." This report is a measure of management's collection efficiency. It keeps the manager and board members current on the status of accounts by exchanges. Under each exchange is shown the number and amount of unpaid accounts for periods of 3 months or more, 2 months, and the current month, plus the cumulative total amount unpaid at the end of the month.

This particular report has paid off for South Central. A recent operating report indicates a cumulative total for a quarterly period of only $335 outstanding, with a quarterly billing running

Manager Bacon works on special records.

a little over $47,000. This means delinquencies are running less than one percent.

EXCHANGE STATION CONTROL is the heading of a form used in the revenue accounting or billing department. This form is a combination of the exchange station movement and control record. It verifies the amount of local exchange revenue, provides data for subscriber history card and system installation and removal reports.

Class of service items are extended under columns headed, "In Service, 1st of Month," "Connects," "Disconnects," "In Service End of Month," and "Contract Values." This record provides necessary information for adequate revenue control and reconciliation of accounts receivable.

SEMI-MONTHLY TIME DISTRIBUTION SHEET — South Central has adopted a time-keeping form which provides a record of employees' time by pay periods. The form makes it possible for each employee to show the actual time spent on each account by work order and provides for computation and distribution of payroll costs.

STAKING SHEET—South Central has made 2 main revisions in this standard form used by the construction force. For one thing, the co-op has added a section which makes the sheet adaptable for Work Order or Retirement Orders. It also includes a section which provides a unit breakdown of each job. These changes give management more complete cost data.

MATERIAL STOREROOM REQUISITION—This is actually a record of materials used and recovered. It is used by the outside plant crew in handling materials for work orders. The form lists the material items stocked and provides for their disposition under columns, "Out," "In," and "Used." Upon completion of a job, the foreman notes materials used and returned on his copy. He turns it in to the storekeeper who completes his own copy by noting materials returned and used. The completed form then goes to the office accountant for pricing of items, and posting of costs in the work order ledger.

Mr. Bacon says that this record is essential to proper cost accounting, and that keeping it current actually makes for less work in the office.

MISCELLANEOUS WORK ORDER—This form is used by a combination man in doing such jobs as installing drop lines, wiring plans, setting poles, and new construction. It is used for small jobs that one or two men can do. The completed order is turned over to the engineering department so that maps can be brought up-to-date. Then the order is channeled to the accounting department.

This form has proved useful and efficient in servicing small jobs in the field. Formerly, workers returned to the office and obtained a staking sheet order number for small jobs, which generally meant a loss of time.

REQUEST FOR SERVICE — This form is filled out at the time the application for membership and telephone service is made. The form is necessary because the membership application goes to the management. This form clears up name and billing address irreg-

ularities, notes class of service wanted, and offers an opportunity to sell telephone service "extras." It gives the co-op office a personal contact with the new applicant and potential subscriber. The form is channeled to the plant department for preparation of the service order.

SERVICE ORDER — This is the keystone in the whole record system in providing telephone service to the subscriber through a systematic plan of action. The plant clerk makes out a 4-copy service order in 4 colors, from information contained in the "Request for Service Order." The copies are labeled for "Commercial and Accounting," "Installer's Copy," "Completion Notice Copy," and "Connecting Company Copy."

Information on the commercial and accounting copy includes all information pertaining to the new subscriber and the service desired.

On the installer's copy, the plant clerk lists information such as cable number, cable pair, line number, open wire pair, terminal address, terminal pair and pole number.

Here is the route these copies take: The plant clerk forwards the commercial and accounting copy to revenue accounting. It is held there until the completion notice copy is received.

The installer receives both the installer's copy and the completion notice copy.

The installer performs the required work and then notifies the chief operator that a service order has been completed. He reports the exchange name where the work was done, service order number, type of service order being worked, directory name on service order and telephone number. He advises the revenue department, giving the exact date of installation and his report to the chief operator.

The installer attaches his copy and the completion notice copy to his daily work report, and gives to the plant department. Then the plant clerk sends the completion notice copy to revenue accounting and forwards the work report and installer's copy to the bookkeeper.

This device has proved highly effective with South Central because it provides an orderly means of directing and accounting for the following: (1) Maintenance of plant accounting records; (2) Maintenance of current billing records; (3) Establishment and maintenance of information and directory listings; (4) Installation moves, changes of telephone service and equipment, name changes, and others.

Actually, Mr. Bacon's ingenuity and versatility in tailoring REA-recommended forms to his own operation has achieved greater operating efficiency for the South Central system.

Agriculture Census of 1954 Shows Gain of 10 Percent Since 1950 in

Telephones On Farms

Percentage-wise, farms with telephones have increased a little more than 10 percent since 1950, according to results of the 1954 Census of Agriculture announced by the Bureau of Census, U. S. Department of Commerce. Nearly one-half of all farms, some 2.3 million, now have telephones.

The percentage of farms reporting telephones was 38.2 percent in 1950. In 1954, it was 48.8 percent. During this time the number of farms reporting telephones increased from 2,057,556 to 2,331,709.

The number of farm telephones dropped in a few states, although in every state the percentage of farms with telephones increased. The drop in number was apparently due to the change from a farm to a non-farm classification for many establishments with telephones.

Rural Telephone Loans

Calendar Year

1955	**$66,806,000**
1954	**66,346,000**
1953	**50,112,000**
1952	**55,077,000**
1951	**37,082,500**
1950	**19,031,000**

The census figures do not differentiate between modern dial telephones and less efficient types of rural service. Recent Department of Agriculture surveys have indicated that of the farms with telephones only about half have dial service and more than one-fourth still have old-style magneto service.

Utah showed the highest percentage gain, with an increase from 51.8 percent to 74.6 percent of farms with telephones. Oregon was next, with an increase from 50.3 to 70.9 percent, and California third with a gain from 57.4 to 77.2 percent.

According to the census, 93.2 percent of Connecticut's farms have telephones—the highest reported. Mississippi showed the lowest percentage with only 13.8 percent of its 215,900 farms having telephones.

The Census of Agriculture also revealed that between 1950 and 1954, there was an 11 percent drop in the number of farms. The total number of farms in April 1950 was 5,382,162. This had dropped to 4,782,393 by November 1954.

The following census figures show changes in number and percentages of farms reporting telephones for given years since 1920:

Year	*Number of Farms Reporting Telephones*	*Percent of all farms*
1954	2,331,709	48.8
1950	2,057,556	38.2
1945	1,866,109	31.8
1940	1,526,954	25.0
1930	2,139,194	34.0
1920	2,498,493	38.7

Number and Percentage of Farms With Telephones, 1950 and 1954, By States

States	1950 Total No. Of Farms April 1950	1950 No. Reporting Telephones	1950 Percent	1954 Total No. Of Farms Nov. 1954	1954 No. Reporting Telephones	1954 Percent
U.S.	5,382,162	2,057,984	38.2	4,782,393	2,331,709	48.8
Ala.	211,512	17,442	8.2	176,956	28,138	15.9
Ariz.	10,412	4,408	42.3	9,321	5,220	56.0
Ark.	182,429	19,201	10.5	145,075	24,360	16.8
Calif.	137,168	78,720	57.4	123,074	94,996	77.2
Colo.	45,578	27,048	59.3	40,749	27,424	67.3
Conn.	15,615	13,081	83.8	12,753	11,882	93.2
Del.	7,448	4,990	67.0	6,297	5,300	84.2
D.C.	28	17	60.7	(NA)	(NA)	(NA)
Fla.	56,921	10,253	18.0	57,543	20,690	36.0
Ga.	198,191	18,624	9.4	165,524	36,501	22.1
Idaho	40,284	22,264	55.3	38,735	26,133	67.5
Ill.	195,268	127,618	65.4	175,543	129,400	73.7
Ind.	166,627	102,994	61.8	153,593	110,756	72.1
Iowa	203,159	166,380	81.9	192,933	168,414	87.3
Kan.	131,394	89,760	68.3	120,167	89,936	74.8
Ky.	218,476	45,808	21.0	193,487	50,086	25.9
La.	124,181	14,364	11.6	111,127	28,457	25.6
Maine	30,358	19,467	64.1	23,368	16,991	72.7
Md.	36,107	19,457	53.9	32,500	22,137	68.1
Mass.	22,220	17,319	77.9	17,361	15,519	89.4
Mich.	155,589	83,136	53.4	138,922	92,968	66.9
Minn.	179,101	107,359	59.9	165,225	112,896	68.3
Miss.	251,383	16,425	6.5	215,915	29,715	13.8
Mo.	230,045	106,673	46.4	201,614	106,306	52.7
Mont.	35,085	9,995	28.5	33,059	12,784	38.7
Nebr.	107,183	69,541	64.9	100,846	73,132	72.5
Nev.	3,110	1,550	49.8	2,857	1,772	62.0
N.H.	13,391	10,055	75.1	10,411	8,207	78.8
N.J.	24,838	17,829	71.8	22,686	19,967	88.0
New Mex.	23,599	3,500	14.8	21,070	5,700	27.1
N.Y.	124,977	87,767	70.2	105,714	87,643	82.9
N.C.	288,508	23,347	8.1	267,906	45,120	16.8
N.D.	65,401	27,214	41.6	61,939	28,358	45.8
Ohio	199,359	119,721	60.1	177,074	126,868	71.6
Okla.	142,246	45,886	32.3	118,979	53,299	44.8
Ore.	59,827	30,104	50.3	54,442	38,615	70.9
Pa.	146,887	77,211	52.6	128,876	88,674	68.8
R.I.	2,598	1,998	76.9	2,004	1,665	83.1
S.C.	139,364	11,901	8.5	124,203	21,606	17.4
S.D.	66,452	36,855	55.5	62,520	37,394	59.8
Tenn.	231,631	43,541	18.8	203,149	61,544	30.3
Texas	331,567	79,080	23.9	292,946	111,395	38.0
Utah	24,176	12,515	51.8	22,825	17,037	74.6
Vt.	19,043	13,267	69.7	15,981	11,910	74.5
Va.	150,997	35,853	23.7	136,416	45,853	33.6
Wash.	69,820	40,166	57.5	65,175	48,164	73.9
W. Va.	81,434	21,724	26.7	68,583	21,751	31.7
Wis.	168,561	99,821	59.2	153,558	103,139	67.2
Wyo.	12,614	4,735	37.5	11,392	5,887	51.7

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PENALTY FOR PRIVATE USE TO AVOID
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LOANS APPROVED NOVEMBER 22 THROUGH DECEMBER 14, 1955

Electrification

$	312,000	Kotzebue Electric Association, Kotzebue, Alaska
	1,000,000	Bowie-Cass Electric Co-op, Douglasville, Texas
	548,000	Magic Valley Electric Co-op, Mercedes, Texas
	155,000	Kaufman County Electric Co-op, Kaufman, Texas
	780,000	Dakota County Electric Co-op, Farmington, Minn.
	20,000	Ozark Electric Cooperative, Mt. Vernon, Mo.
	495,000	Fleming-Mason Rural Electric Co-op, Flemingsburg, Ky.
	160,000	Teche Electric Co-op, Jeanerette, La.
*	50,000	Price Electric Co-op, Phillips, Wis.
*	100,000	Withlacoochee River Electric Co-op, Dade City, Fla.
	820,000	San Patricio Electric Co-op, Sinton, Texas
	71,000	Washakie Rural Electric Co., Worland, Wyo.
	210,000	Hart County EMC, Hartwell, Ga.
	310,000	Union Rural Electric Co-op, Marysville, Ohio
*	50,000	Dairyland Electric Co-op, Grand Rapids, Minn.
*	150,000	Northern Lights, Inc., Sandpoint, Idaho
	325,000	Davidson Electric Membership Corp., Lexington, N.C.
	205,000	Cornelius Electric Membership Corp., Cornelius, N.C.
	500,000	Trempealeau Electric Co-op, Arcadia, Wis.
*	15,000	Trempealeau Electric Co-op, Arcadia, Wis.

*—Includes Section 5 funds

Telephone

$	170,000	Farmers Mutual Telephone Co., Lynden, Wash.
	400,000	Southern Telephone Company, Brooklyn, Mich.
	131,000	The Eureka Telephone Co., Corydon, Ind.
	485,000	Randolph Telephone Membership Corp., Asheboro, N. C.
	442,000	West Wisconsin Telephone Co-op, Downsville, Wis.
	193,000	Totah Telephone Company, Inc., Ochelata, Okla.
	267,000	Gorham Telephone Company, Gorham, Kans.
	288,000	Home Telephone Company, Inc., Galva, Kans.
	479,000	Fillmore County Telephone Co-op, Houston, Minn.
	263,000	Arab Telephone Company, Arab, Ala.
	170,000	Northeast Louisiana Telephone Co., Collinston, La.
	146,000	The Nova Telephone Company, Nova, Ohio
	214,000	Yorkville Mutual Telephone Co., Yorkville, Tenn.
	265,000	The Inter-County Telephone Co., Gallatin, Mo.
	419,000	Hector Telephone Company, Hector, Minn.
	154,000	Waco Telephone Company, Asbury, Mo.
	440,000	West River Mutual Aid Telephone Corp., Hazen, N. D.
	219,000	Hinton Telephone Company, Hinton, Okla.
	417,000	Parsons Telephone Company, Parsons, Tenn.
	196,000	Chatham Telephone Co., Chatham, La.
	171,000	Webster-Calhoun Cooperative Telephone Association, Gowrie, Iowa